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(54) Two step programming method of remote controller

(57) A method for selectively binding at least one appliance of a plurality of appliances of a system to at least one remote control of a system. The method comprises the following steps: in the first step, transmission of an identification code by at least one of the appliances to the at least one remote control is initiated by means of the at least one remote control, and in the second step, by the at least one remote control, an appliance is called whose identification code is received by the at least one remote control in step 1, through transmission of the received identification code. After this, the called appliance responds with a signal and by means of the at least one remote control, the called appliance is recorded in the system as being a bound appliance if it is to be bound to the at least one remote control.

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Description

[0001] The invention relates to a method for selectively binding at least one appliance of a plurality of appliances of a system to at least one remote control of the system, wherein the at least one remote control comprises a transmitter and the appliances comprise a receiver.

[0002] Binding is a procedure providing that the bound appliance or the bound appliances can exclusively be controlled by the remote control in a known manner. Non-bound appliances cannot be controlled by the remote control.

[0003] Such method is known from British patent application GB 2259172. In the known system, the remote control transmits an identification code to the relevant appliance. Upon reception, the appliance transmits a light signal, whereupon a user energizes the remote control for terminating the binding procedure for the relevant appliance. After binding, the relevant appliance can be controlled in a known manner with the remote control.

[0004] Many forms of remote controls are known. Particularly the appliances based on infrared communication are widely used. Virtually all TV appliances are equipped herewith. The binding between the appliance to be controlled and the remote control (the hand-held) is often not explicitly present; the beam form, and also the range of the transmitter provide the possibility of selective control. Through the use of different codes, several types of appliances can be controlled with the same hand-held. The use of remote control for luminaires entails another problem, the usual infrared communication requires sight contact between the luminaire and the hand-held. This means that an infrared receiver should be provided on a visual location on the luminaire. Two objections can be raised to this. In the first place there is an objection of an aesthetic nature in respect of an infrared eye, and in the second place there is a constructional objection that in the usual embodiment, the control electronics of the luminaire are located at the top side and integration with the infrared receiver is not possible. A second drawback of an infrared-based system is the high power consumption of the infrared transmitter in the hand-held. This limits the lifetime of the batteries.

[0005] Hence, a solution based on high-frequent communication, for instance in one of the frequency bands designated for short-range devices, seems to be obvious. However, the major problem here involved is the coupling between luminaire and hand-held. Unlike the infrared solution, a simple antenna construction does not yield a sharp beam. As there is no sight contact of the antennae, the shadow effect of the metal of the luminaire is also important. Reflections may cause additional couplings which, if they are in the correct phase with the main wave, actually attenuate it. In addition, there is the spread in sensitivity of the receivers, which provides that the spread in distance between luminaire and hand-held to which a receiver responds can be very great. At the high frequencies usual for this, a far-field situation is involved, and the reduction of the field strength is inversely proportionate to the distance to the transmitter. Through the use of much lower frequencies, the near-field situation can be reached, so that the field strength is inversely proportionate to the third power of the distance. Even in this situation, it cannot always be guaranteed that the luminaire with the smallest distance to the hand-held is the only one to respond.

[0006] As it cannot be guaranteed that the luminaire with the smallest distance to the hand-held is the only one to respond, this again implies that the above-mentioned binding procedure, known per se, cannot be applied. Indeed, when in the known procedure the identification code is transmitted by means of the hand-held, it will generally be received by several luminaires, which is precisely not the intention of the known method.

[0007] The object of the invention is to provide a solution to the above-outlined problems.

[0008] Accordingly, the method according to the invention is characterized in that each of the appliances of the system comprises a transceiver and an identification code and that the at least one remote control comprises a transceiver, the method comprising at least the following steps:

-1. In a first step, transmission of an identification code by at least one of the appliances to the at least one remote control is initiated by means of the at least one remote control; and
-2. In a second step, at least one appliance is called whose identification code is received by the at least one remote control in step 1, through transmission of the received identification code by the at least one remote control, whereupon the called appliance generates a signal and, by means of the at least one remote control, the called appliance is recorded in the system as being a bound appliance if it is to be bound as desired to the at least one remote control.

[0009] Since according to the invention, the first step initiates, by means of the remote control, at least one of the appliances transmitting an identification code to the remote control, it can be indicated in an individualized manner in the second step that the relevant appliance whose identification code has been received is or is not bound to the remote control. The possibility that in step 2, the identification code that is received by the remote control and subsequently transmitted is also received by other appliances does not influence the binding procedure. Indeed, only the appliance which comprises the relevant identification code will generate said signal, after which it can be decided whether the appliance generating the relevant signal can be recorded in the system as being a bound appliance. Also to the first step, it applies that initiating by means of the remote control can-

not only be performed with infrared, but also with high-frequent communication signals. After all, when more appliances are initiated by means of the remote control, these appliances will transmit different identification codes to the remote control. Each identification code received can then, in step 2, be processed on an individual basis as explained hereinabove.

[0010] Preferably, it applies that in step 1, the following substeps are performed: by the at least one remote control, at least one call signal is transmitted to the appliances of the system; and in response to the reception of the at least one call signal, at least one appliance of the system transmits at least one identification code to the at least one remote control.

[0011] Since each of the appliances that have received the at least one call signal transmit an identification code to the at least one remote control, the at least one remote control can call, after reception of the relevant identification code, in step 2, an appliance via HF-communication, on the basis of its identification code without it being problematic that the relevant identification code is also received by other appliances having other identification codes.

[0012] Hence, in the remote control according to the invention, use can be made of HF-communication, preferably utilizing equipment meeting the SRD standards intended therefor. The selectivity problems are solved by following the relevant binding procedure prior to use. During this binding, the coupling between appliance, for instance luminaire, and the at least one remote control (the at least one hand-held) is made, whereupon the bound luminaire, after binding, exclusively responds to codes from the hand-held.

[0013] The invention will now be further explained with reference to the drawing. In this drawing:

Fig. 1 schematically shows a system, known per se, of a plurality of appliances and at least one remote control for controlling the appliances remotely;
Fig. 2 shows a specific arrangement of the system according to Fig. 1;
Fig. 3a schematically shows the curve of the field strength in the far field;
Fig. 3b shows the curve of the field strength in the near field;
Fig. 4 schematically shows a system wherein a part of a possible embodiment of a method according to the invention is used; and
Fig. 5 shows a system wherein another part of the possible embodiment of the method is used.

[0014] In Fig. 1, reference numeral 1 designates a system comprising a plurality of appliances 2i (i = 1,2,..., n). In this example, the appliances 2.1 and 2.2 are shown. These appliances can, for instance, consist of a television, audio equipment or a luminaire. The system further comprises at least one remote control 4 for operating the appliances 2.1 and 2.2. For this purpose, the appliances 2.1 are each provided with a receiver 4 connected to a control unit 6 of the appliance. The remote control 4 transmits commands by means of infrared radiation, designated in the drawing by reference numeral 8. The receiver 4 of the appliance 2.1 has a clear view of the remote control 4 and can control the appliance 2.1 via the control unit 6. In the example of Fig. 1, the second appliance 2.2 is not radiated by the infrared beam 8. Thus, this beam determines the selectivity. By directing the remote control 4 to the appliance 2.i, which is desired to be controlled by means of the remote control, exclusively the relevant appliance 2.1 is controlled and not the other appliance 2.2.

[0015] Fig. 2 shows a second embodiment of a system comprising a plurality of appliances and at least one remote control. Here, parts corresponding to Fig. 1 are provided with the same reference numerals. However, in this case, the remote control 4 does not generate infrared radiation for transmitting commands, but instead, high-frequency electromagnetic signals are applied. This concerns, for instance, radio signals according to, for instance, the SRD standard. As a result, the beam 10 is much wider than the infrared beam 8 of Fig. 1. In this example, the receivers 4 of the appliances 2.1, 2.2 and 2.3 are suitable for receiving HF-electromagnetic signals transmitted by the remote control 4. In this example, the appliance 2.1 is disposed behind a wall 12. Also, the receiver 4 proves to be disposed behind the control unit 6 of the appliances. However, this has no adverse effect on the reception of the radio signals transmitted by the remote control 4. Each of the receivers 4 of the appliances 2.1, 2.2 and 2.3 will receive the commands from the remote control. Even the appliance 2.1 located behind the wall 12 receives the beam 10. As a result, each of the appliances 2.1, 2.2 and 2.3 is simultaneously controlled by means of the remote control 4. The user of the remote control does not even notice that the appliance that is located behind the wall 12 is controlled as well.

[0016] Due to the use of a low frequency, far-field propagation is replaced by the near field. Fig. 3a shows the curve of the field strength of the beam 10 in the far field as function of the distance to the remote control 4. In Fig. 3b, this function stands for the near field. At the near field, the function is much steeper. Even this steep curve does not provide a reliable solution to the selectivity problem.

[0017] This selectivity problem is solved by the method according to the invention. The method according to the invention is outlined with reference to the system according to Figs. 4 and 5. In Figs. 4 and 5, parts corresponding to Figs. 1 and 2 have been provided with the same reference numerals. However, the remote control 4 now comprises a transceiver unit 14 for transmitting and receiving said high-frequent electromagnetic signals. Hence, this concerns, for instance, radio signals. Apart from the at least one remote control 4, the system 1 further comprises a plurality of appliances 2.i (i =

1,2,3... n). In this example, the appliances 2.1, 2.2 and 2.3 are shown. Each of the appliances 2.1 comprises a transceiver 4. Further, each appliance comprises a control unit 6 for controlling the appliance. The beam transmitted by the transceiver 14 of the remote control 4 is again designated by reference numeral 10. Further, each of the appliances 2.i has a unique identification code associated with the relevant appliance. In this example, the identification code is stored in the control unit 6 of the relevant appliance.

[0018] It is the intention that, selectively, at least one appliance of the plurality of appliances 2.i is bound to at least one remote control, in this example to remote control 4. In this example, a possible method for binding the appliances to this remote control 4 is performed. To this end, a first step initiates, by means of the at least one remote control 4, at least one of the appliances 2.i transmitting an identification code to the at least one remote control 4. This concerns the identification code stored in the control unit 6 of the relevant appliance. In a second step, at least one appliance is called, whose identification code is received by the at least one remote control in step 1, through transmission of the received identification code by the at least one remote control. In this example, the following steps are performed in step 1. With the at least one remote control 4, at least one call signal 16 is transmitted to the appliances of the system by operating the keys 18, 20 of remote control 4. In this example, the call signal is transmitted on a high-frequent electromagnetic carrier wave. Hence, this concerns a radio signal having a wide beam. In this example, it applies that the call signal is received by the appliances 2.2 and 2.3. Appliance 2.1 does not receive the call signal, for instance because the appliance in question is positioned too far away. In response to the reception of the at least one call signal, the appliances 2.2 and 2.3 each transmit their identification code 22 and 22' respectively to the at least one remote control 4. In particular, it further applies that the appliances 2.2 and 2.3 indicate, by means of the generation of, for instance, an audio signal and/or a visual signal, that the relevant appliance has received the at least one call signal. If the relevant appliance 2.2 is a luminaire, this can for instance be effected in that the control unit 6 causes the luminaire in question to blink. Subsequently, the identification codes 22, 22' received by the at least one remote control 4 are stored in the at least one remote control. This storage is at least temporary for further processing. In Fig. 4, "0 0" designates that no codes are stored in the remote control.

[0019] In the above-mentioned second step, it applies in this example that the following substeps are performed: by means of the at least one remote control, in this example, each of the stored identification codes 22, 22' (see Fig. 5) are transmitted for calling the relevant appliances, after which, upon reception of the identification codes 22, 22' by each of the relevant appliances 2.2 and 2.3, each of the relevant appliances 2.2 and 2.3 respond by generating the above-mentioned signal. Next, by means of the remote control, each appliance that responds and should be bound is marked in the system. In this example, the identification codes received by the remote control are transmitted one after the other. First, the identification code of the appliance 2.2 is transmitted. Next, this appliance responds by generating an audio signal or a visual signal. In this example, the appliance 2.2 is a luminaire and the visual signal consists in blinking of the appliance 2.2. A user of the remote control 4 then sees which appliance is responding. The user then decides that this appliance should be bound. For this purpose, he presses the keys 18, 20 of the remote control. As a result, the appliance 2.2 is marked in the system 1. In this example, the marking is stored in the remote control. The marking of the appliance 2.2 can, for instance, be effected by the permanent storage of the relevant identification code in the remote control, for instance in a special memory of a remote control. It is also possible that the marking of an appliance is carried out by adding a marking code to the relevant identification code of the appliance 2.2 which identification code was already stored earlier in the remote control in step 1. Next, the remote control 4 transmits the received identification code of the appliance 2.3. This appliance 2.3, too, will subsequently generate said signal, in this example blink when it concerns a luminaire. The user sees the appliance blinking and then decides that this appliance should not be bound. He notifies this to the system by actuating the key 20 of the remote control. In that case, the appliance 2.3 is not marked. After this, the binding procedure for the appliances has ended. This for instance appears from the fact that the remote control no longer calls any other appliances. The binding procedure can also be ended by a time-out of the remote control when it is no longer operated. The binding procedure can also be ended through actuation of a key of the remote control. In this example, after the binding procedure, only the appliance 2.2 can be controlled by the remote control. In this example, it applies that the identification code 22 is first transmitted for selectively binding the appliance 2.2 and that subsequently, the identification code 22' is transmitted for selectively binding the appliance 2.3. Of course, during transmission of, for instance, the identification code 22', only appliance 2.3 will respond and not appliances 2.1 and 2.2. The fact that the beam 10 is wide, as a result of which, at any rate, the appliance 2.2 receives the identification code 22 as well, forms no problem, because only appliance 2.3 will respond.

[0020] In this example, it applies that in the first step, appliances 2.2 and 2.3 will respond approximately simultaneously with the transmission of the identification codes 22 and 22'. However, according to the invention, this is not necessarily the case. For instance, in each of the control units 6, a random generator may be incorporated which generates, at random, a small time delay for transmitting the identification codes 22 and 22' re-

spectively. Further, in this example, it applies that only one remote control is present. This is not necessarily the case, either.

[0021] Of course, entirely analogously to what is described in the foregoing, other remote controls may also be selectively bound to one or more of the appliances 2.i. It is also conceivable that the remote control 4 is used for binding the appliances, after which the information stored in the remote control 4 is transmitted over the bound appliances to the other remote control which will eventually be used for the control of the appliances. Further, it is conceivable that the binding of a particular appliance in step 2 is performed at a moment other than the binding of another appliance in step 2. In this respect, one may, for instance, think of the appliance 2.1 which is bound to the remote control 4 at a later time. Other possibilities and arguments for this are likewise conceivable. It is also conceivable that the appliances are bound in groups. Each group of appliances is then bound to one remote control as discussed hereinabove. Different groups are bound to different remote controls, as discussed hereinabove. These different remote controls may be accommodated in one housing. Further, corresponding parts of these remote controls may be replaced by one part. Such variants are each understood to fall within the framework of the invention.

Claims

1. A method for selectively binding at least one appliance of a plurality of appliances of a system to at least one remote control of the system, the at least one remote control comprising a transmitter and the appliances comprising a receiver, characterized in that each of the appliances of the system comprises a transceiver and an identification code and that the at least one remote control comprises a transceiver, the method comprising at least the following steps:

   -1. In a first step, transmission of at least one identification code by at least one of the appliances to the at least one remote control is initiated by means of the at least one remote control; and
   -2. In a second step, at least one appliance is called whose identification code is received by the at least one remote control in step 1, through transmission of the received identification code by the at least one remote control, whereupon the called appliance generates a signal and, by means of the at least one remote control, the called appliance is recorded in the system as being a bound appliance if it is to be bound as desired to the at least one remote control.

2. A method according to claim 1, characterized in that in step 1, the following substeps are performed:

   by the at least one remote control, at least one call signal is transmitted to the appliances of the system; and
   in response to the reception of the at least one call signal, at least one appliance of the system transmits its identification code to the at least one remote control.

3. A method according to claim 2, characterized in that the at least one identification code received by the at least one remote control is at least temporarily stored in the at least one remote control for further processing.

4. A method according to claim 2 or 3, characterized in that in the second step, at least the following substeps are performed:

   by means of the at least one remote control, the at least one received identification code is transmitted for calling the relevant appliance,
   whereafter, upon reception of the identification code by the relevant appliance, the relevant appliance responds by generating said signal; and
   by means of the remote control, the relevant appliance which responds and is to be bound is marked in the system.

5. A method according to claim 4, characterized in that the identification code of each appliance which is to be marked in the system, is marked in the at least one remote control.

6. A method according to claim 5, characterized in that the marking of an appliance is performed through the permanent storage of the relevant identification code in the remote control.

7. A method according to claim 5, characterized in that the marking of an appliance is performed by adding a marking code to the relevant identification code stored in the remote control.

8. A method according to any one of the preceding claims, characterized in that the appliance called in the first step responds by transmitting an audio signal or a visual signal.

9. A method according to any one of the preceding claims, characterized in that the transmitter of the at least one remote control operates on a radio frequency.

10. A method according to any one of the preceding claims, characterized in that the appliances consist

of luminaires.

11. A method according to any one of the preceding claims, characterized in that the recording of the called appliance in the system by means of the at least one remote control, is performed by actuating a key of the remote control.

12. A method according to any one of the preceding claims, characterized in that the binding procedure is ended by a time-out of the remote control.

13. A method according to any one of the preceding claims, characterized in that the binding procedure is ended by actuating a key of the remote control.

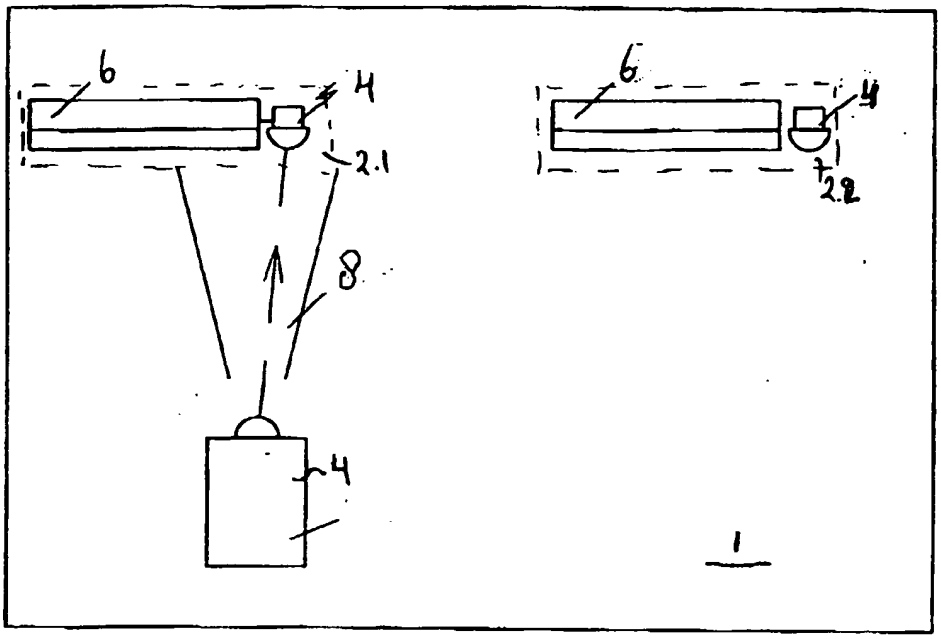

fig. 1

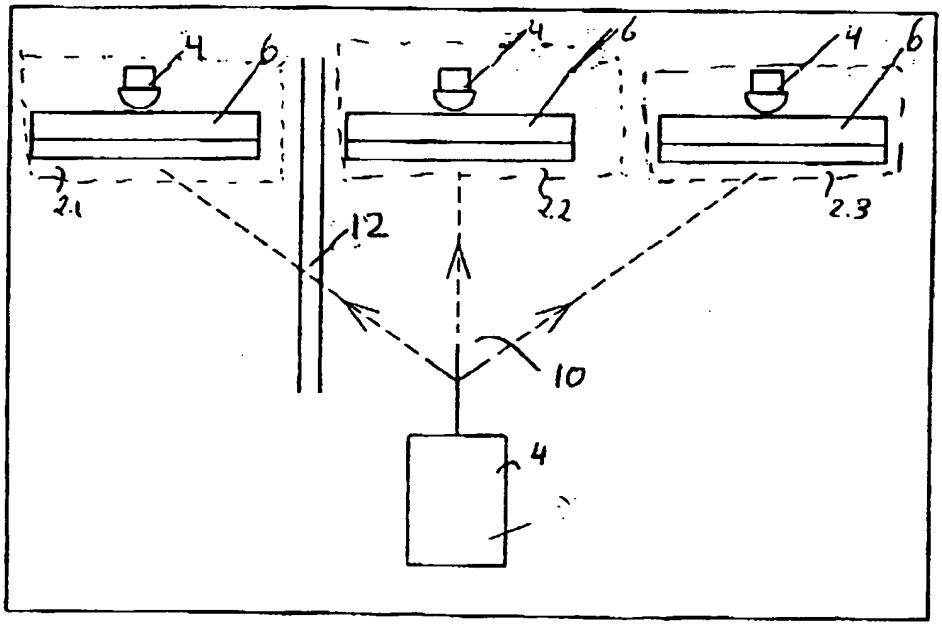

fig. 2

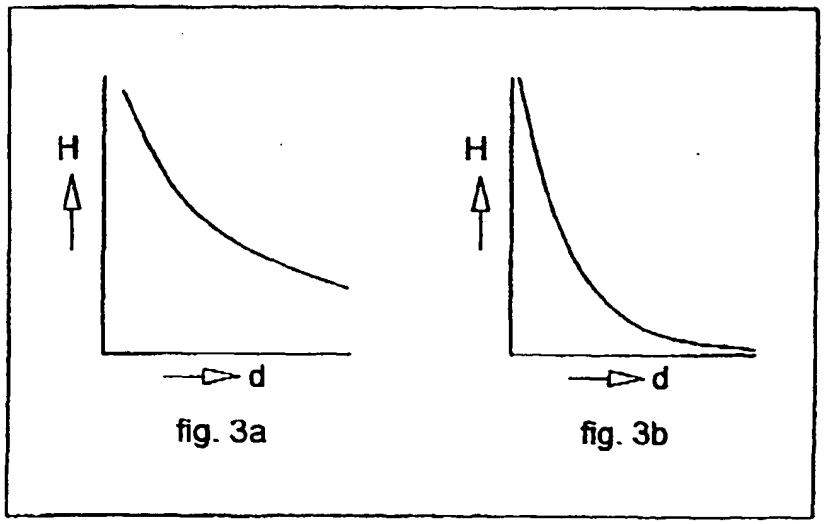

fig. 3a

fig. 3b

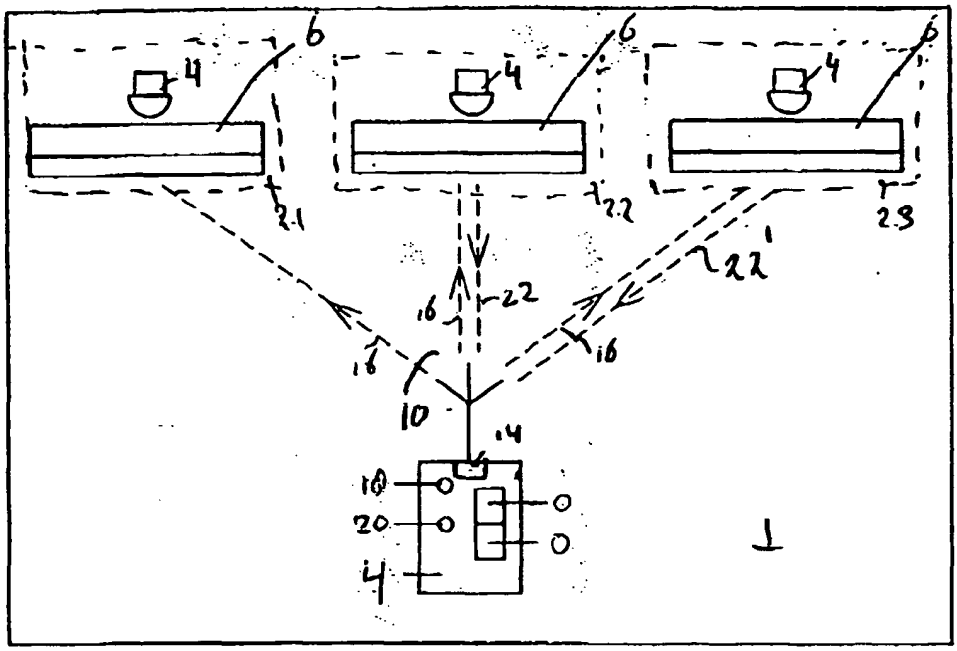

fig. 4

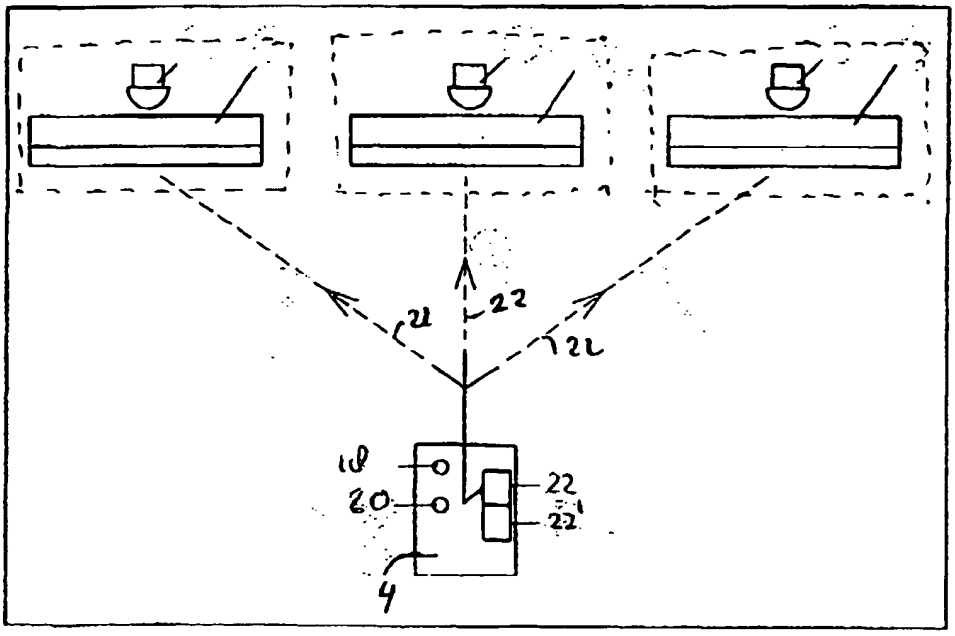

fig. 5

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EUROPEAN SEARCH REPORT

Application Number
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H03J
G08C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 September 2000	Pham, P

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